Space Weather Forecast

Issued on Wednesday, 06 September 2023 at 01:20 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1 Minor Radio Blackouts Likely 06 Sep, then Chance throughout. Probable peak slight chance of G1/Minor Geomagnetic Storm early current UTC day.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate in the past 24 hours, with GOES16 and 18 recording isolated Moderate flares emanating from a complex region near centre-disc, at 05/0812UTC and 05/1945 UTC. The only other significant flare was a Common-class flare from just beyond the northeastern limb, which may be associated with a newly arriving region. There are currently nine sunspot groups on the visible disc - the most dynamic being the previously mentioned region in the centre-disc, although one region in the northeast is being monitored after developing quickly through 04 and 05 September. Two new bi-polar regions have started to emerge across the eastern limb. These regions will be monitored as they rotate further onto the visible disc. The other regions remain relatively small, simple and/or unchanged.
A large Coronal Mass Ejection (CME) with partial halo was observed on coronagraph imagery at 05/1400 UTC, leaving the Sun from the far-side of the disc, beyond the northwest limb. Initial analysis of this feature does not show an Earth-directed component. However, what may be a separate CME is visible on imagery beyond the southwest limb around 05/1600 UTC and is yet to be analysed.

Solar Wind / Geomagnetic Activity: The solar wind environment was initially at slow-ambient levels around 380 km/s until 05/1438 UTC with speeds rapidly increasing to around 430 km/s. This is considered to indicate the arrival of a Coronal Mass Ejection (CME) that left the Sun on 01 September. Wind speeds have since remained at Slightly Elevated levels, 420-460 km/s. The interplanetary magnetic field showed a largely level trend at weak levels before fluctuating upon arrival of the CME. The important north-south component weakly fluctuated until 05/1438 UTC, and again from around 05/1900 UTC neither strongly co- or anti-aligned (with Earth's field). The intervening period saw stints of co- and anti-aligned orientation.

The net result of the above solar measures was for Quiet (Kp 0-2) geomagnetic activity, then Active (Kp 4) or Unsettled (Kp 3) periods from 05/1500UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely on Day 1 (06 Sep), from a currently active region near the centre disc. There is a daily Chance of Moderate-class flares that increases slightly from midweek with the arrival of a returning active region, coupled with the increased complexity of the aforementioned front-sided sunspot group near the centre disc.

Solar Wind / Geomagnetic Activity: The geomagnetic forecast is for a peak Slight Chance of Active (Kp 4) or G1/Minor Geomagnetic Storm (Kp 5) intervals early within the current UTC. In the absence of further Coronal Mass Ejections (CMEs), activity should remain largely Quiet to Unsettled (Kp 0-3). However, there is low confidence in slight enhancement Days 2-3 (07-08 Sep) from any contribution from a fast wind from a coronal hole, or from a potential CME glancing blow.

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Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	15	5	5	2
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	40	40	50
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	2	2	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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